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NOTE ON A UNIFORM PLAN OF DESCRIBING THE HUMAN SKULL.

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In a recent study of the human skull I attempted to frame a method of uniform description which answers a useful purpose. Assuming that the skull presents a norma frontalis, a norma basilaris, a norma lateralis and a norma verticalis, the following order of procedure is recommended. Beginning at the norma frontalis and proceeding from above downward I note the following:

The *degree of prominence of the glabella and supraorbital ridges*, by defining an arc between nasion and ophryon, by a piece of flexible wire, drawing a chord for the arc and measuring the versed sine. (In a given case it would read as follows—g. and s. o. r.=5 mm.). Next the degree of deflection of the supraorbital margin is recorded on a protractor. (In a given case s. o. m.=40°).

The nasal bones yield three portions:—the *frontal portion* which is bounded above by the frontal bone; the *maxillary portion*, which lies between the frontal bone and premaxilla; the *premaxillary portion* which lies in contact with the premaxilla. The frontal portion is measured from the union of the nasal bone and the ascending process of the maxilla to the proximal free end of the lateral margin of the nasal bone. The maxillary portion constitutes the greater part of the bone and lies entirely in contact with the ascending process of the maxilla. The premaxillary portion is the least well defined and lies on the lateral margin of the bone a few millimeters above the free distal margin of the bone. The suture between the premaxilla and maxilla is never found after an early stage of development; notwithstanding this, the manner in which the premaxilla and the nasal bones unite in the apes, taken together with the ranges of variation in this same line, as noted in the human subject, give the observer an accurate impression of the extent of naso-premaxillary junction. The texture of the naso-premaxillary suture is distinctive. The nasal bone is further divided into two parts, that which lies in contact with the frontal bone and the ethmoid bone and is outside of the nasal chamber, and that which lies below the one last named and is entirely within the nasal chamber; the first

part will receive the name of *radix* and the last part the name of *salient*. The degrees of angulation of both radix and salient being measured on a protractor we have in a given case the following formulæ: n. f. 4 mm.; n. mx. 10 mm.; n. pr. 2 mm.; r. 7 mm., 90°; s. 10 mm., 40°.

The next region in order is the vestibule of the nasal chamber, which is accepted as the nasal aspect of the premaxilla as seen at the floor of the nose. When the parts of this region are as in the child, it is called *pædomorphic*, but when the pædomorphic features have not been retained the departures from this type are defined as follows: The height and elevation of the vestibule just in advance of the incisive foramina receives the name of *incisive eminence*; the degree of definition of the line extending from the sides of the anterior nasal aperture to the anterior spine receives the name of the *alveolar line*, since it defines the alveolus proximally; the *alveolus* measured from the alveolar line to the alveolar point of Broca (a.=15 mm.). The nasal vestibule may be in addition macrolophic, microlophic or analophic, depending upon the degree of development of the *incisor crest*. This is held to be a better classification of the parts than that presented by writers. The most primitive type is the analophic; the most frequent in modern cultivated races is the macrolophic. The North American Indian tends to be microlophic and passes from this infrequently to the analophic. He is rarely macrolophic.

Turning to the norma basilaris and describing from before backward, the hard palate is described in the terms of Broca hyperbolic, parabolic, or U-shaped. The choanæ are either pædomorphic or broader at base than at apex; the diameter is to be taken (ch. pædom. diam. 22 mm.). The pyramidal process of the palatal bone measures in length in a given case 12 mm. (pyr. pr.=12 mm.).

The spinous process of the sphenoid bone, whether it separates from or unites with the tympanic bone, is to be noted; if united with this, whether the line of union is posterior to that of the Gasserian fissure. In a given case (sp. pr. not in contact with tym.).

The foramen lacerum medium whether open or closed is to be observed. In a given case (f. l. m. open). The petrosal part of the tympanic bone whether narrowed or broad, by being inflated on the median aspect. In a given case (p. inflated).

Passing now to the norma lateralis, it is noted that the temporal ridge is found interrupted at the stephanion; in a given case

(S-interruption=10 mm.) and that the temporal ridge is divided into two parts, the fronto-temporal ridge and the parietal-temporal ridge. In a given case (fr. t. r. spinose: pt. r. *nil.*). The parieto-temporal ridge as it reaches the lambdoidal suture begins to be slightly raised above the plane of the parietal bone and is joined to the occipital bone near the asterion by a harmonic suture; or, as it reaches the lambdoidal suture it has no influence in changing the serrated character of this line which extends to the asterion in the manner described by writers. In a given case we have (p. t. r. harmonic near A., 3 mm.). The posterior margin of the frontal process of the malar bone may be produced in a conspicuous process, (the marginal process) or it may be absent. In a given case (marg. pr. trenchant.=5 mm. high). If desirable the height of the process could be measured by a line drawn across its base. The interruption of the temporal ridge at the stephanion, the harmonic character of the lambdoidal suture near the asterion, and the large size of the marginal process correlate with the size of the temporal muscle.

The line of the parieto-squamosal suture at its junction with the portion of the temporal bone back of the squamosa may be marked by a *mortise*, which answers to the summit of the petrosa as it joins the side of the skull; thus we have (m.=3 mm.).

The term "sconce" is used to express in a general sense the region on the norma verticalis which lies between the parieto-temporal ridges. This diameter at its narrowest part is recorded, in a given instance as (sc. 110 mm.).

The lower jaw yields at the *condyloid process*, two facets, the lateral, which articulates with the zygoma, and the median which articulates with the squamosa beneath the brain-case. The median facet is more variable than the lateral and may be horizontal and inclined upward, or horizontal, inclined downward. In a given case (condyl. pr. med. fac. horizontal). The *coronoid process* may project at base so far forward as to conceal in whole or in part the third molar when the parts are seen in norma lateralis, or it may lie so far back as to permit the third molar to be seen. In a given case (cr. pr. concealing 3 mm.). The *mental foramen* may be on a line with the first molar, in the interval between premolar and first molar, on the line of the second premolar, or on a line between the first and second premolar. In a given case (m. f. on line of 3 m.). The *maseteric impression* ends on a line answering to the angle of the jaw or

stops at a distance proximal to it; the area between those two lines constitutes the *lemurine process*. In a given instance (lm. pr.=3 mm. wide). The genial spine may be single or double. The genial crest trenchant, rudimental, or absent. In a given case (g. s. double: g. c. nil.).

In reviewing the characters which have been thus employed the glabella and supra-orbital ridge (g. and s. o. r.) almost universally constitute male characters of low grade. We expect in primitive man, this character to be better developed than in more recent man and be more apt to enter into composition of the supra-orbital margin (s. o. m.). No doubt is felt in accepting these important features in the descriptions of skulls. The degree of declination of s. o. r. is of importance in distinguishing long, slender from broad, flat faces; indeed, it stands as a sign of character of face. Analysis of the nasal region needs no defence since craniologists are of one mind, that on the whole the best characters separating crania are to be found in this region; hence, the care taken to define the relations of the nasofrontal, the maxillary and the premaxillary portions. For the terms *radix* and *salient* I am alone responsible. The value of the vestibule would appear also to admit of no argument. The distinction between pædomorphic and other forms in the writer's judgment is the best means of separating the types of the anterior nasal apertures from one another.

The value of the alveolus and the shape of the hard palate as defined by Broca needs no comment at this place. The length of the pyramidal process has been neglected by writers. I find it of value in the comparative anatomy of race. The shape of the choanæ having been defined I recognize two types, one of which is pædomorphic and is oval and the other in which the base is wider than the apex. The group last named may be subdivided by the *rectangular* form in which the basal and the lateral contour unite to form a right angle; and the *produced* in which the basal contour is extended downward and outward beyond the line of the lateral contour. The study of the choanæ is of importance; the limitations have not been satisfactorily determined. The degrees of development of the spinous process of the sphenoid bone have likewise been neglected. It overlaps the line of the Gasserian and the sphenoido-tympanic fissures forward to a remarkable extent and, for the most part sex can be distinguished, the process being large and prominent in males, and rudimental or absent in females.

The divisions of the temporal ridge into two parts, the fronto-temporal and the parieto-temporal and an interruption between the two is one of the best characters by which sex can be distinguished; the same is true of the conversion of the asterionic portion of the lambdoidal suture from a serrated to a harmonic type.

The value of the marginal process of the malar bone in distinguishing sex is conceded. The mortise in the squamoso-parietal suture and the division of the condyloid process into two facets are of secondary value.

The degree of concealment of the third molar has been overlooked, considering the significance that this relation possesses in studies of the horizontal ramus. It is evident that the degree of concealment of the third molar is in direct ratio to the reduction of size of the dentigerous portion of the bone and (all things being equal) is an evidence of the departure from the primitive type. The phylogenetic value of the so-called lemurine process of Albrecht needs to be defined. I have noted this process in the gibbon. The position of the mental foramen with respect to the sockets of the premolars and the first molar teeth is a character in osteology not to be gainsaid. In view of the results of Topinard in studying the region of the mental symphysis in primitive man it is necessary to describe accurately all structural variation at this place, hence peculiarities in the shapes of the genial spine and the genial crest are given.